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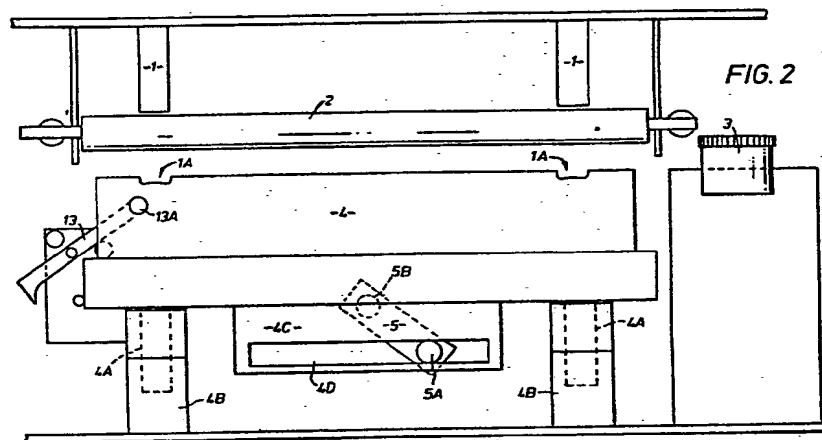
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BE DE FR GB NL(71) Applicant: BUSINESS AIDS LIMITED
3 Whitby Avenue
London NW10 7SQ(GB)(72) Inventor: Pitman, Cyril Leonard
46, Hulham Road
Exmouth Devon(GB)(74) Representative: Blatchford, William Charles et al,
WITHERS & ROGERS 4 Dyers Buildings Holborn
London, EC1N 2JT(GB)

(54) A machine and a method for producing saddle-stapled booklets.

(57) A machine (Fig. 2) for producing a saddle-stapled booklet has a tray for receiving and registering sheets to form a group of sheets. The group of sheets is moved horizontally between the upper edge of a vertically movable folder blade (4) between a pair of parallel, side-by-side rollers (2) to fold the sheets. Continued upward movement of the blade (4) drives the folded group of sheets against a pair of staplers (1,1). The booklet thus produced is rejected laterally by a pair of crease-forming rollers (3) disposed side-by-side and rotatable in parallel vertical axes.

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"A machine and a method for producing
saddle-stapled booklets."

This invention relates to a machine and a method for producing saddle-stapled booklets. A "saddle-stapled booklet" is a number of printed sheets, for example of A4 size paper, which are folded in half as a group, to A5 size, and then stapled along the fold, to form the saddle-stapled booklet.

To produce such booklets it is known to use apparatus which is part of a printing machine and which mass-produces the booklets by folding the sheets of paper in groups and by stitching the folded groups. It is also known to use several separate devices, firstly a folding device, then a jogging and gathering device, and then a stapling device.

The known machines are either large and expensive, or involve handling of paper between several devices.

5 There is thus a requirement for a relatively simple and relatively inexpensive single machine which can produce booklets quickly and in quantity.

 According to one aspect of this invention, a machine for producing saddle-stapled booklets comprises a tray for forming a group of sheets; a folder blade
10 or saddle for engaging and moving the group of sheets between fold-forming members for folding the group of sheets and for pushing the folded group of sheets at the fold against a stapling device for insertion of staples through the folded sheets; and means for
15 ejecting the folded and stapled booklet. Preferably the tray is horizontal and includes devices for registering sheets to form the group of sheets. The fold-forming members preferably comprise a pair of parallel and horizontal rollers, spaced a small
20 distance apart, so that the sheets are pushed by the folder blade between the rollers to fold the group of sheets centrally. Preferably also the folder blade or saddle is driven upwardly in a single vertical plane and in a continuous movement to fold the group of
25 sheets and then to push it against the stapling device. The latter preferably comprises a number of staplers, the number of staplers corresponding to the number of staples required to be inserted in the group of sheets.

According to another aspect of this invention, a method for producing saddle-stapled booklets comprises the steps of:- forming a group of sheets; moving the formed group of sheets to a position between a folder blade on the one hand and a stapling device on the other; and causing the blade to engage and move the group of sheets in a continuous movement and in a single plane firstly between fold-forming members so as to form a group of sheets folded along a fold line, and secondly against the stapling device for insertion of staples through the sheets at the fold line to form a booklet.

An embodiment of the invention will now be described by way of example, with reference to the accompanying diagrammatic drawings, in which:-

Figure 1 is a diagrammatic side elevation of the machine, as seen from the ejection side;

Figure 2 is a diagrammatic front elevation of the machine, as seen from the left hand side of Figure 1; and

Figure 3 is a diagrammatic top plan view of the machine.

In Figure 2 the input side of the machine is to the left and the ejection or output side to the right. In Figure 3 the input side is at the top and the ejection side at the bottom. The several Figures are drawn to different scales.

Referring to the drawings, two staplers 1,1, each with a magazine of known type and containing a supply of staples, are parallel, spaced apart, and stationary. Disposed below and transversely to the staplers 1,1 are two horizontal parallel rollers 2, 5 between which is a small gap, Fig. 1. Centrally below the gap is a folder saddle or blade 4 mounted for up and down movement by pins 4A,4A slidable in vertical bores in frame pillars 4B,4B. A lower part 4C of 10 the blade 4 has a slot 4D in which is received a crank pin 5A on a crank arm 5 which is mounted on and rotatable by a shaft 5B. An electric motor 8 drives the shaft 5B by way of a gearbox 9, shaft 9A, belt 10, shaft 6A, and a magnetic clutch 6. The electric motor also 15 drives a pair of crease-forming and booklet ejecting rollers 3,3, by way of the gear box 9, shaft 9B, belt 10A, idler pulley 11, and belt 10B.

Electrical and control elements will not be described, but operation of the machine can be 20 virtually automatic once the sheets of paper are placed ready in a stacking and aligning tray. The latter is not shown, but is a horizontal tray disposed at a level (Fig. 2) such that a group of sheets, stacked and aligned on the tray, will be level with the gap 25 between the top of the folder blade 4 and the rollers 2, and will be moved horizontally from the tray to be engaged by the top surface of the blade 4.

To form a booklet, a group of for example 15 to 17 printed A4 sheets are placed in the tray, which is constructed so as to register the group of sheets accurately. Then the horizontally lying group of registered sheets is moved horizontally and to the right (Fig. 2) centrally above the blade 4 into the space between the blade 4 and the rollers 2,2. This space is seen in Fig. 1 below the rollers 2,2 and above the upper edge of the folder blade 4 which in Fig. 1 is seen between the booklet creasing and ejecting rollers 3,3. As soon as the group of sheets is in position above the folder blade 4, the latter is driven upwardly and carries the group of sheets upwardly in a vertical plane into the gap between the rollers 2,2, so that the combined action of the blade and rollers folds the group of sheets along a central fold line to form the booklet.

The blade 4 acts not only as a folder bar, but as a saddle or anvil and in its upper edge has two spaced staple-receiving recesses 1A,1A, Fig. 2.

The upward motion of the blade 4 continues, so driving the fold of the booklet against two staples, one of which projects from each stapler 1. The staples are driven through the thicknesses of folded paper, and are bent over by the two recesses in the top edge of the blade 4. Thus the folder blade drives the group of sheets upwardly in a single continuous motion in a

vertical plane. Firstly it causes the group of sheets to be folded by the rollers 2,2, and secondly it drives the folded group of sheets against the staplers 1,1. The folder blade thus forms an anvil against which the staples are bent.

The blade 4 then descends, on continued rotation of the crank 5, until the fold of the booklet is in the space below the rollers 2,2. Then an arm 13 (Fig. 2) pivots upwardly around a shaft 13A, strikes the left hand end of the booklet and drives it to the right so that the fold of the booklet is caught between the knurled ejection rollers 3,3, which, while ejecting the booklet from the machine, also press against the fold of the booklet to crease it and make the fold tighter.

In a prototype machine, a time of only four seconds was required, from placing a group of sheets on the tray, to ejection of the folded and stapled booklet from the machine.

Although the above-described embodiment uses an upwardly driven folder and stapling blade, it would be possible for instance to reverse the arrangement, so that the group of sheets of paper was driven downwardly on to staplers. Also the particular drive arrangement shown could be replaced by other forms of drive.

Claims:

1. A machine for producing saddle-stapled booklets comprises a tray for forming a group of sheets; a folder blade or saddle (4) for engaging and moving the group of sheets between fold-forming members (2,2) for folding the group of sheets and for pushing the folded group of sheets at the fold against a stapling device (1,1) for insertion of staples through the folded sheets; and means (13, 3,3) for ejecting the folded and stapled booklet.
2. A machine according to claim 1 wherein the tray lies in a horizontal plane and includes devices for registering sheets to form the group of sheets.
3. A machine according to claim 1 or claim 2 wherein the fold-forming members comprise a pair of parallel rollers (2,2), spaced a small distance apart.
4. A machine according to claim 3 wherein the rollers (2,2) are horizontal and the folder blade (4) is disposed in a vertical plane for movement upwardly between the rollers and into a position below the stapling device (1,1).
5. A machine according to any preceding claim wherein the stapling device comprises a number of staplers (1,1), which number is the same as the number of staples required for the booklet.

6. A machine according to claim 1 wherein the folder blade (4) is driven upwardly in a single vertical plane and in a continuous movement to fold the group of sheets and then to push it against the stapling device (1,1), which is stationary.

7. A machine according to any preceding claim wherein the folder blade (4) is formed with staple-receiving depressions (1A).

8. A machine according to any preceding claim wherein the means for ejecting the folded and stapled booklet comprises a pivotally mounted arm (13) which strikes one end of the booklet to move it from the folder blade (4).

9. A machine according to claim 8 wherein the means for ejecting the booklet includes a pair of creasing rollers (3,3) between which the booklet is moved by the arm (13).

10. A method for producing saddle-stapled booklets comprises the steps of:-

forming a group of sheets;

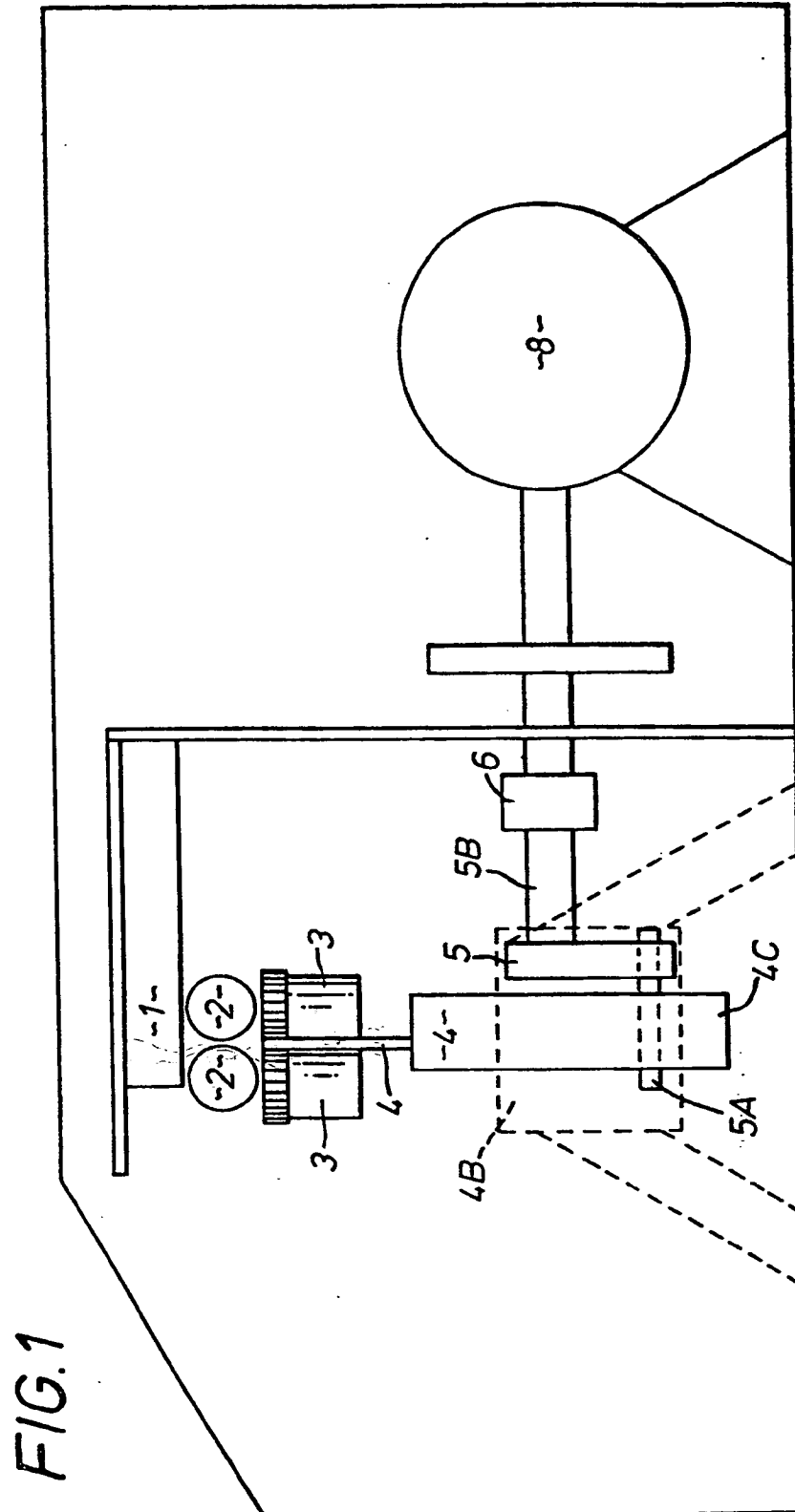
moving the formed group of sheets to a position between a folder blade (4) on the one hand and a stapling device (1,1) on the other; and

causing the folder blade (4) to engage and move the group of sheets in a continuous movement and in a single plane firstly between fold-forming members (2,2)

so as to form a group of sheets folded along a fold line,
and secondly against the stapling device (1,1) for
insertion of staples through the sheets at the fold line
to form a booklet.

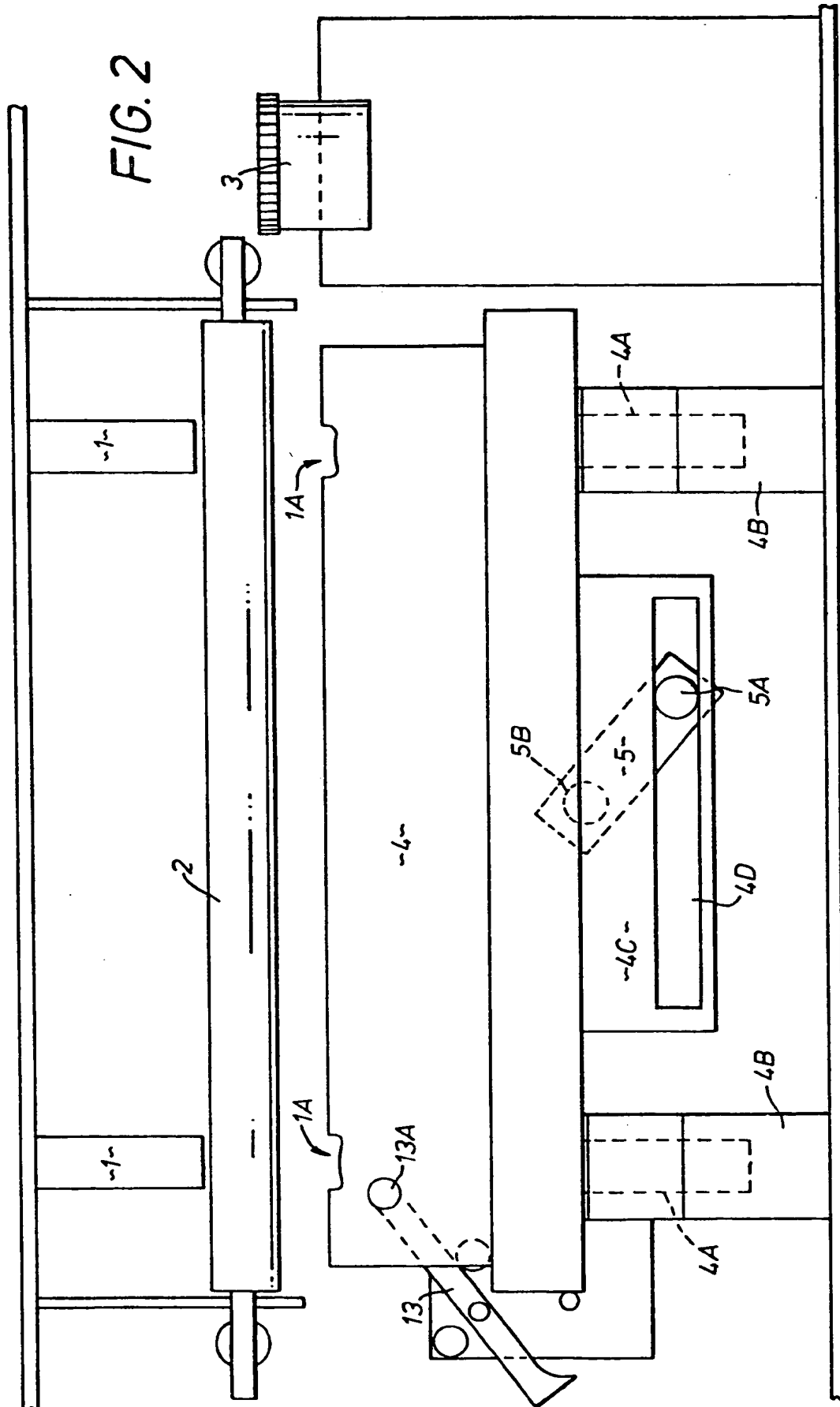
11. A method according to claim 10 wherein the group of
sheets is moved in a horizontal direction between
the folder blade (4) and the stapling device (1,1).

12. A method according to claim 10 or claim 11 wherein
the said single plane is a vertical plane.



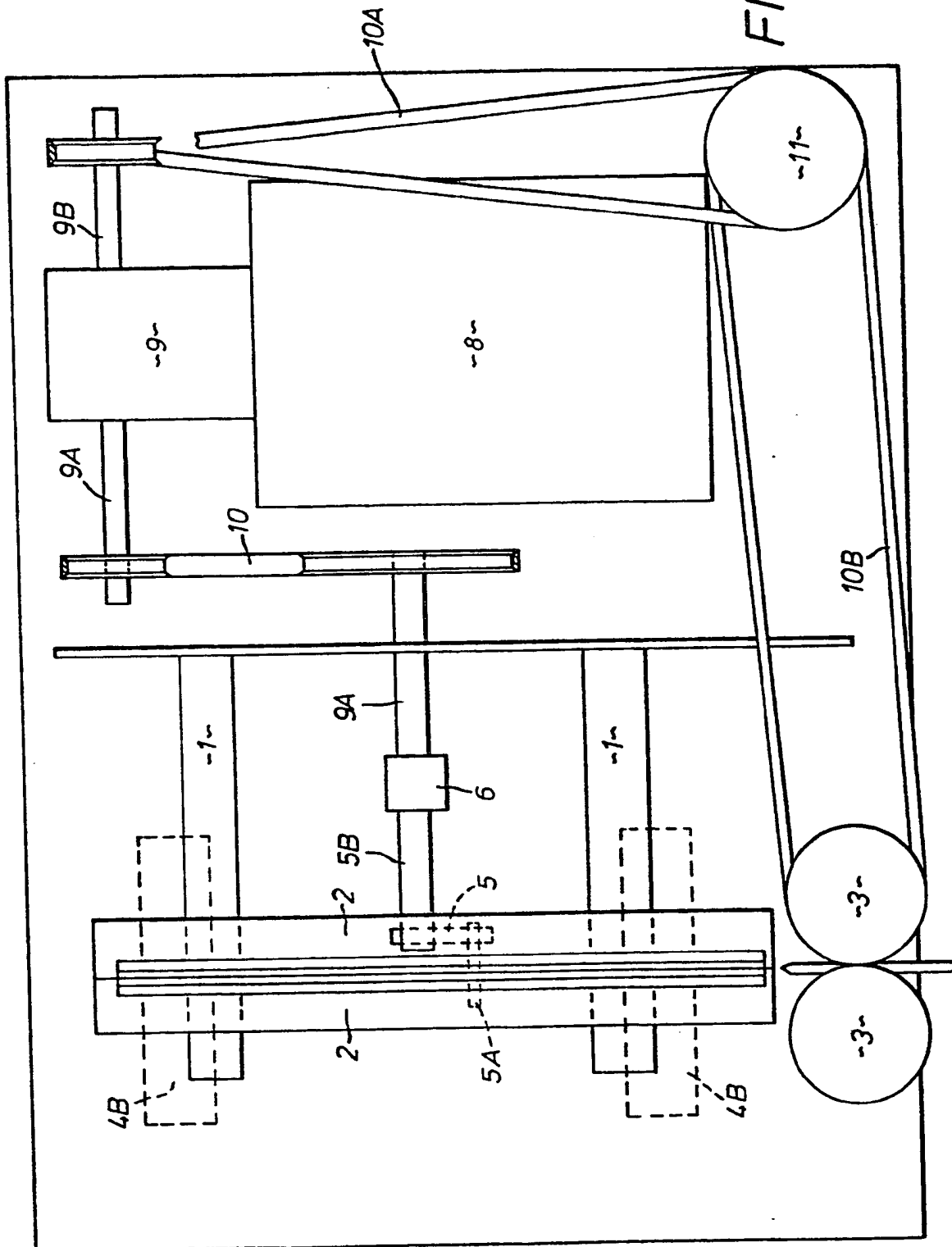
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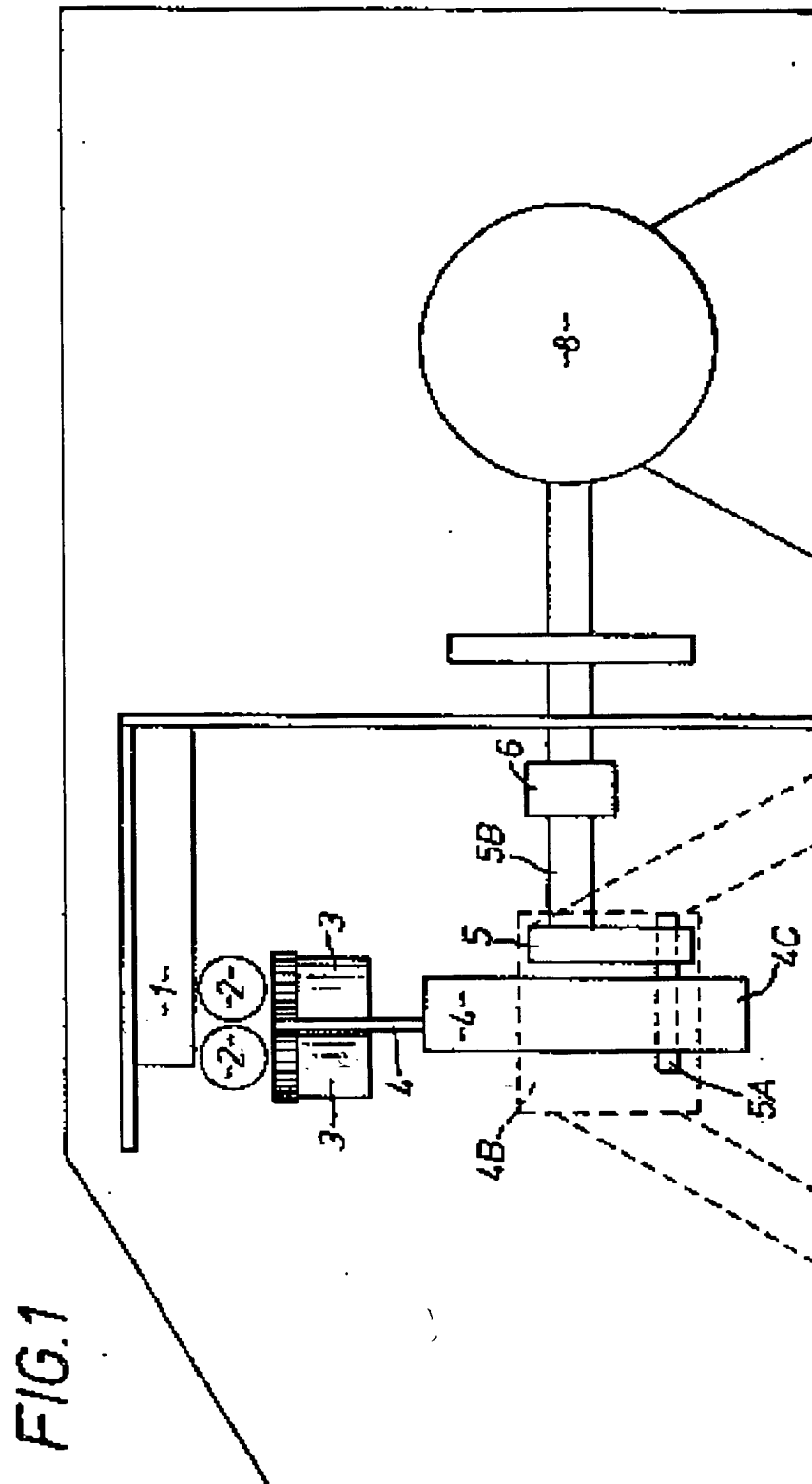
FIG. 2

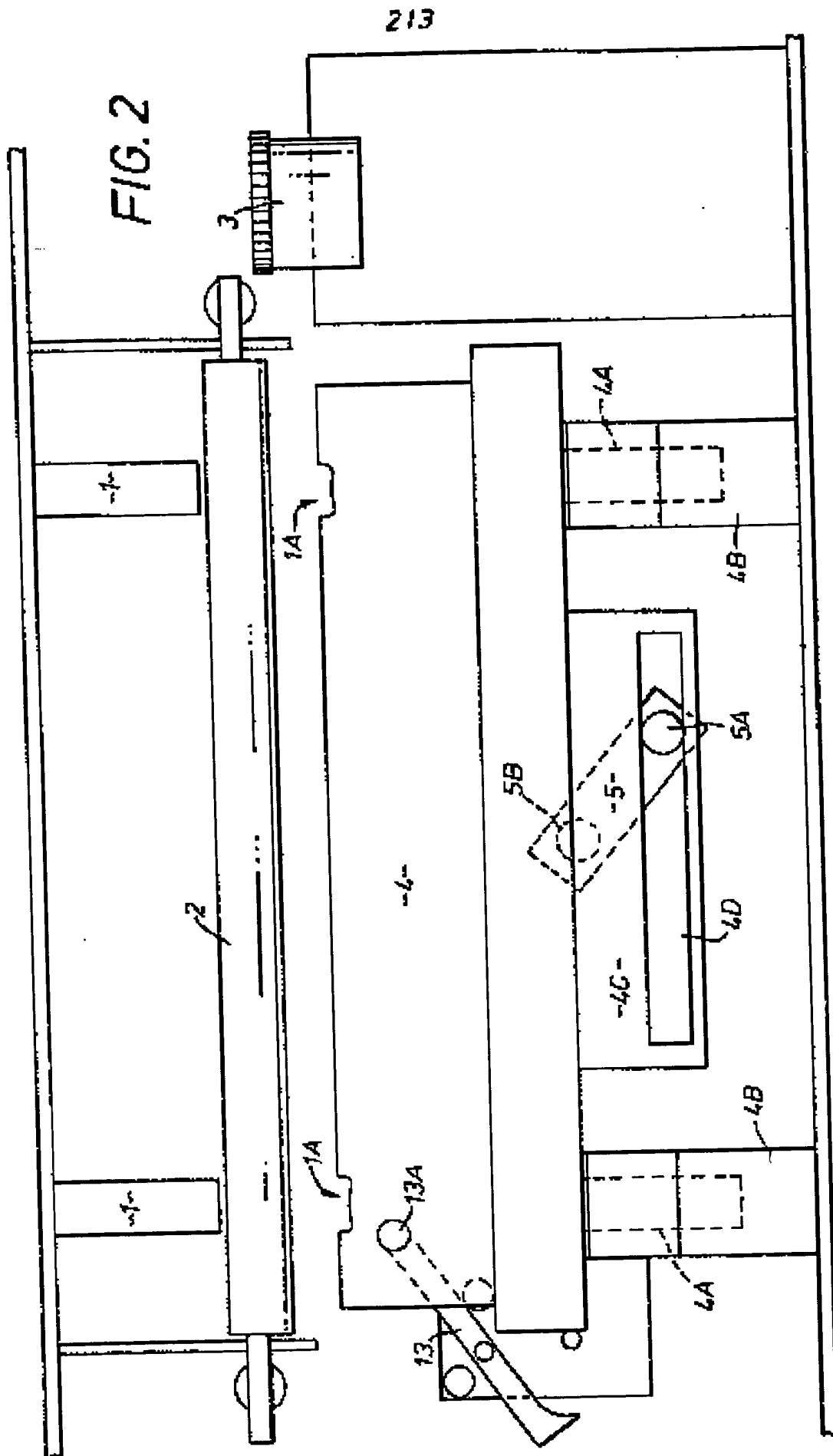


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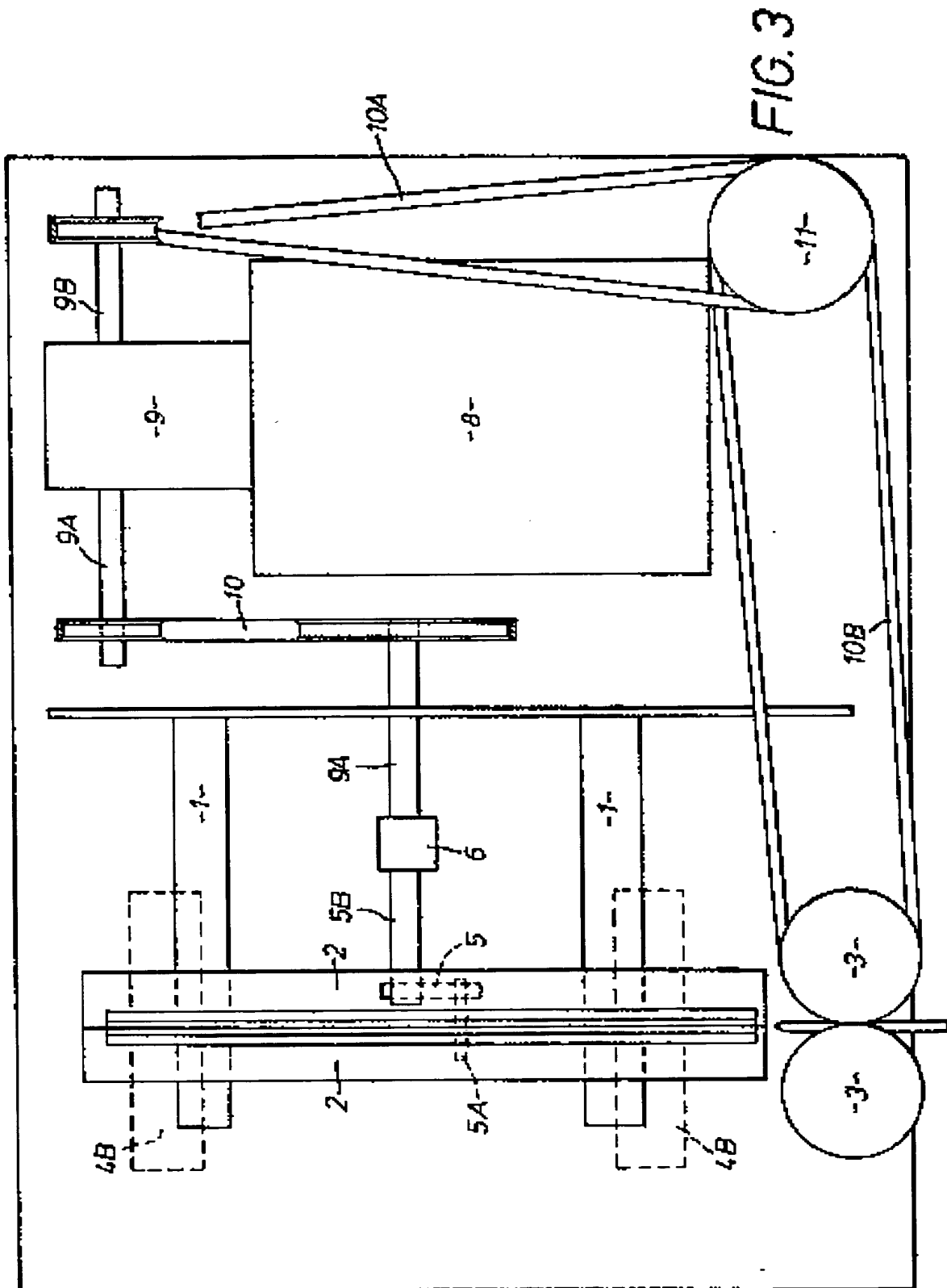
FIG. 3







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(71) Applicant: **BUSINESS AIDS LIMITED**
3 Whitby Avenue
London NW10 7SQ(GB)

(72) Inventor: **Pitman, Cyril Leonard**
46, Hulham Road
Exmouth Devon(GB)

(74) Representative: **Blatchford, William Charles et al.**
WITHERS & ROGERS 4 Dyers Buildings Holborn
London, EC1N 2JT(GB)

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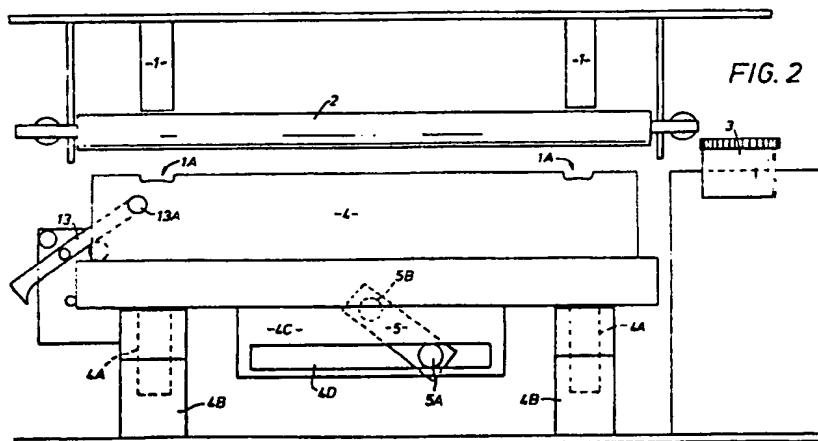


FIG. 2

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EUROPEAN SEARCH REPORT

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
	<u>DE - A - 2 242 576 (Fa.E.C.H.WILL)</u> * Whole document * --	1-5, 7 10-12	B 42 B 4/00
	<u>DE - C - 128 017 (COTTRELL)</u> * Whole document * --	1, 10, 11, 12	
A	<u>DE - A - 2 242 577 (Fa.E.C.H.WILL)</u> * Whole document * --	1, 10	TECHNICAL FIELDS SEARCHED (Int. Cl.)
A	<u>DE - C - 74 535 (JULIUS THEODOR OTTO)</u> * Whole document * ----	1, 10	B 42 B B 65 H
			CATEGORY OF CITED DOCUMENTS
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Place of search		Date of completion of the search	Examiner
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